

INDETERMINATE EFFECTS OF CRISIS INTERVENTION TEAMS ON LAW  
ENFORCEMENT OFFICER SHOOTINGS OF PEOPLE WITH MENTAL ILLNESSES

by  
Brian J. Connell

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## **Abstract**

After the 1987 police shooting of a mentally ill Memphis man, the Crisis Intervention Team (CIT) model was developed to train police officers to better respond to similar cases. However, decades later, little research exists on the effectiveness of CIT programs to address that issue. Given the recent increase in attention to police shootings and a high rate of police interactions with mentally ill people, it is important to determine the effectiveness of the CIT model through evidence-based research. This article presents an empirical analysis of the impact of CIT programs on fatal police shootings of mentally ill individuals. The findings of this paper align with the consensus of limited existing scholarship that the impact of CIT programs is not statistically significant; however, the findings differ by indicating a marginal increase in the probability of shootings occurring in locations with CIT programs rather than having a reductive effect.

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## 1. Introduction

In recent years, a number of local law enforcement agencies have introduced crisis intervention teams (CIT), law enforcement officers (LEO) who have been trained to respond to mental health cases and interact with mentally ill people by de-escalating situations, avoiding officer or suspect injury, and referring mentally ill persons to mental health services rather than jailing them, when practical. These teams are often deployed to areas with high concentrations of mentally ill individuals or are directed by law enforcement dispatchers to respond to mental health emergencies disturbance calls.

There are several models of crisis response teams. They can be comprised of mental health professionals in an entirely mental health-based specialized response, a pair or other combination of mental health professionals and law enforcement in a police-based mental health response, or a completely police-based response in which officers are trained to identify and interact with individuals with mental illnesses. The latter model of a police-only response is the format of the CIT model analyzed in this research.

The police-based CIT model was developed after a police shooting of a mentally ill man in Memphis, Tennessee in 1987.<sup>1</sup> In the aftermath of that incident, the Memphis Police Department determined that it needed to better train its officers to respond to similar situations, and to be able to de-escalate interactions with mentally ill individuals rather than responding in ways that might result in unnecessary jailing of mentally ill

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<sup>1</sup> Sema Taheri, "Do Crisis Intervention Teams Reduce Arrests and Improve Officer Safety? A Systematic Review and Meta-Analysis," *Criminal Justice Policy Review* 27, no. 1 (2016): 78.

persons who would be better served by being referred to mental health treatment or increase the risk of physical injury of the suspect or responding officers.<sup>2</sup>

The Memphis Police Department solicited the assistance of the University of Memphis (UofM) Department of Criminology and Criminal Justice to help design a program to address these issues. In partnership with the Memphis Police Department, the UofM Department of Criminology and Criminal Justice developed the Memphis Crisis Intervention Team (CIT) model, also referred to as the “Memphis Model.” Using this model, self-selecting police officers receive forty hours of classroom instruction and hands-on training to de-escalate interactions with mentally ill individuals and protect themselves and the suspects from physical harm. In theory, the CIT model educates and trains officers to better identify and interact with mentally ill persons. By being able to recognize people with mental health issues and understand actions and words that might increase or decrease tension, resistance, or other potentially negative responses by the suspect, the officers are better able to triage and resolve situations, referring individuals to mental health services instead of booking them in jail when necessary and appropriate.<sup>3</sup>

That CIT model has spread nationally through local law enforcement and mental health partnerships over the course of the last few decades. The CIT model has been

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<sup>2</sup> Taheri, "Do Crisis Intervention Teams Reduce Arrests and Improve Officer Safety? A Systematic Review and Meta-Analysis," 78.

<sup>3</sup> Michael T. Compton, Demir Neubert, Berivan N, Beth Broussard, Joanne A. McGriff, Rhiannon Morgan, and Janet R. Oliva. "Use of Force Preferences and Perceived Effectiveness of Actions among Crisis Intervention Team (CIT) Police Officers and Non-CIT Officers in an Escalating Psychiatric Crisis Involving a Subject with Schizophrenia." *Schizophrenia Bulletin* 37, no. 4 (2011): 47.

replicated in over 2,700 law enforcement agencies, locally and regionally, throughout the country and abroad.<sup>4</sup> While the CIT model was initially developed to address the shooting of a mentally ill man, it has developed a number of other applications, such as pre-booking jail diversion, redirection to mental health services, and de-escalation of situations to prevent injury to the responding officer. While those are desirable outcomes, it is also important to evaluate the model in the context of the case it was initially designed in response to.

Understanding the potential impact, weaknesses, and other applications of the model are imperative considering recent revelations that fatal police shootings are happening at higher rates than previously reported.<sup>5</sup> In theory, the CIT model should reduce the number of officer-involved shootings (OIS) because CIT-trained officers should be more adept than their less-trained peers at recognizing and interacting with people who have mental illnesses. Those officers should have a better understanding of different types of mental illnesses and what approaches or actions in those situations might resolve them without escalating the risk of physical harm to themselves or the mentally ill person. This research expands on and contributes to current scholarship by expanding the scope of research to the impact of the primary police-based mental health response model, the CIT model, on the occurrence of OIS of people showing signs of mental illness. More specifically, this research analyzes whether CIT programs cause a

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<sup>4</sup> Taheri, "Do Crisis Intervention Teams Reduce Arrests and Improve Officer Safety? A Systematic Review and Meta-Analysis," 78.

<sup>5</sup> The Washington Post, *2018 Police Shooting Database*, updated February 5, 2018, <https://www.washingtonpost.com/graphics/2018/national/police-shootings-2018/> (accessed February 7, 2018).

reduction in officer-involved shootings of individuals showing signs of mental health issues compared to other locations without CIT programs.

## **2. Literature Review and Theoretical Framework**

Current scholarship on the topic is fairly limited as most empirically-based research on CIT models have addressed the impact of CIT programs on police officers' ability to identify and refer for treatment those individuals suffering from mental health issues. In some cases, studies have analyzed officers' escalation and use of force, but that research has not specifically addressed lethal force against mentally ill persons. Those studies generally measured CIT model success by effects on incarceration rates, length of incarceration, recidivism, other physical and mental harm experienced by individuals with mental health issues while they are detained. While there is some research on this topic, those studies primarily addressed these other effects of CIT models.

This research aims to close the knowledge gap that currently exists within scholarship on CIT programs by evaluating the impact of CIT models on officer-involved shootings of mentally ill persons specifically. As the CIT model was created in response to the shooting of a mentally ill individual by police officers, it is expected that it should have a reductive effect on the occurrence of those shootings in addition to the previously mentioned, tangential outcomes. Unfortunately, the general consensus of existing literature on the impact of CIT models on police officer use of force is less positive and substantive, concluding that its impact is negligible or nonexistent in terms of statistical significance.

The general consensus of existing literature is that CIT models have a moderate positive impact on the outcome of officers' interactions with individuals with mental

illnesses. A meta-analysis review of five studies, using officer self-reports and official records, found through differences in differences of means analysis that the impact of CIT training on officers' use of force was not only marginal in magnitude, but also not statistically significant.<sup>6</sup> Only one of the five studies demonstrated a reductive effective of CIT programs on officer use-of-force. The other four studies found negligible or null effects at insignificant levels.<sup>7</sup>

Another study reviewed selected survey responses of CIT-trained and non-CIT-trained about hypothetical scenarios involving individuals with psychotic disorders and analyzed them through repeated-measures analysis of variance. That study found that CIT-trained officers were slower to escalate use of force and that the preferred level of force was less significant than the actions chosen by their untrained peers.<sup>8</sup> Although that study did not include observations of actual police interactions with mentally ill persons, it found that CIT training might better prepare officers to deal with mental disturbance calls and help them de-escalate those situations.<sup>9</sup> Other studies supported those findings as well, concluding that CIT-trained officers used force less in encounters considered to be at a high risk for violence, and they also concluded that CIT-trained officers generally

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<sup>6</sup> Taheri, "Do Crisis Intervention Teams Reduce Arrests and Improve Officer Safety? A Systematic Review and Meta-Analysis," 86.

<sup>7</sup> Ibid.

<sup>8</sup> Compton, et al, "Use of Force Preferences and Perceived Effectiveness of Actions among Crisis Intervention Team (CIT) Police Officers and Non-CIT Officers in an Escalating Psychiatric Crisis Involving a Subject with Schizophrenia," 737.

<sup>9</sup> Ibid., 744.



used less aggressive methods of force; however, those studies did not provide a quantitative assessment of the use of lethal force against mentally ill persons.<sup>10</sup>

In a smaller scale study of an individual police department, the effect of the CIT model implementation on police use of force in encounters with mentally ill individuals seemed to be more pronounced. That study found that CIT-trained officers had improved perception of mentally ill people and their knowledge of, and association with, mental health resources contributed to improved outcomes for mentally ill persons who interacted with police officers.<sup>11</sup> Another small-scale study that focused on a single district of one law enforcement agency found that the impact of CIT implementation was negligible at the department level, but at the district level where there were more significant variations in saturation of CIT-trained officers in the police force there were much more significant reductions in use of force with individuals with mental illness.<sup>12</sup>

The same study also found that individual characteristics of police officers and suspects were relatively insignificant in determining the use of force and that physical resistance by the suspects was the greatest predictor instead.<sup>13</sup> Furthermore, that study found that while CIT-trained officers were slightly more likely to use force, perhaps

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<sup>10</sup> Jennifer Skeem and Lynne Bibeau, "How does Violence Potential Relate to Crisis Intervention Team Responses to Emergencies?" *Psychiatric Services* 59, no. 2 (2008): 201.

<sup>11</sup> Amy C. Watson, "Research in the Real World: Studying Chicago Police Department's Crisis Intervention Team Program," *Research on Social Work Practice* 20, no. 5 (2008): 541.

<sup>12</sup> Melissa S. Morabito, Amy N. Kerr, Amy Watson, Jeffrey Draine, Victor Ottati, and Beth Angell, "Crisis Intervention Teams and People with Mental illness: Exploring the Factors that Influence the use of Force." *Crime & Delinquency* 58, no. 1 (2012): 57.

<sup>13</sup> *Ibid.*, 70.

because they had more frequent interactions with mentally ill persons, they increased their use of force more slowly than their less-trained peers when suspects physically resisted. Ultimately, the study concluded that CIT and non-CIT officers were similarly likely to use force when physical resistance increased to high levels, and also found that physical resistance, rather than officer training, was the greatest predictor of that use of force.<sup>14</sup>

There is also an extensive field of research on the impact of CIT models on officers' ability to identify and respond to individuals with mental illness. The general consensus within this field is that officers with CIT training are more adept at identifying and responding to individuals with mental illness, resulting in lower arrest rates of mental illness subjects, and higher referrals to psychiatric treatment.<sup>15</sup> Additional research has also shown a reduction in the rates of officer injuries among CIT-trained officers when responding to calls of suspected-mental illness individuals.<sup>16</sup> Further research compared pre-booking and post-booking diversion programs for mentally ill substance-using individuals and found the CIT model to have exemplary results.<sup>17</sup> That study found that

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<sup>14</sup> Morabito, et al, "Crisis Intervention Teams and People with Mental illness: Exploring the Factors that Influence the use of Force." 71.

<sup>15</sup> Randolph Dupont and Sam Cochran, "Police Response to Mental Health Emergencies--Barriers to Change," *The Journal of the American Academy of Psychiatry and the Law* 28, no. 3 (2000): 338-344.

<sup>16</sup> Gordon Strauss, Mark Glenn, Padma Reddi, Irfan Afaq, Anna Podolskaya, Tatyana Rybakova, and Osman Saeed, "Psychiatric Disposition of Patients Brought in by Crisis Intervention Team Police Officers," *Community Mental Health Journal* 41, no. 2 (2005): 223.

<sup>17</sup> Pamela K. Lattimore, Nahama Broner, Richcard Sherman, Linda Frishman, Michael S. Shafer, "A Comparison of Prebooking and Postbooking Diversion Programs for Mentally Ill Substance-Using Individuals with Justice Involvement," *Journal of Contemporary Criminal Justice* 19 (2003): 41.

individuals diverted out of the judicial process, prior to jail booking, and into mental health services also reported fewer later arrests and for less serious offenses.<sup>18</sup>

Another study reviewed officer preparedness and found that CIT-trained officers were more likely to indicate that they felt well prepared for situations involving persons with mental illnesses, that they were less likely than their peers to report confidence in other officers' preparedness, and that they were more likely to consider the mental health system to be helpful.<sup>19</sup> A similar study also found that CIT programs improved the crisis response capacity and capabilities of law enforcement agencies, and that it also reduced officer injuries while increasing the number of transports for mental health care and diverting them from jail.<sup>20</sup> A further study reviewed three specialized response models, including the Memphis CIT mode, and found the Memphis model to have a lower arrest rate for calls regarding mentally ill persons and that those calls resulted in referrals to mental health treatment at higher rates than the other specialized programs.<sup>21</sup>

Although each of these studies demonstrated the effectiveness of preparing officers to respond to situations with mentally ill persons and refer them to mental health

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<sup>18</sup> Lattimore, et al, "A Comparison of Prebooking and Postbooking Diversion Programs for Mentally Ill Substance-Using Individuals with Justice Involvement," 41.

<sup>19</sup> Michael T. Compton, Masuma Bahora, Amy C. Watson, and Janet R. Oliva, "A Comprehensive Review of Extant Research on Crisis Intervention Team (CIT) Programs," *Journal of the American Academy of Psychiatry and the Law* 36 (2008): 737.

<sup>20</sup> Henry J. Steadman, Martha Williams Deane, Randy Borum, and Joseph P. Morrissey, "Comparing Outcomes of Major Models of Police Responses to Mental Health Emergencies," *Psychiatric Services* 51, no. 5 (2000): 649.

<sup>21</sup> Judy Hails and Randy Borum, "Police Training and Specialized Approaches to Respond to People With Mental Illnesses," *Crime & Delinquency* 49, no. 1 (2003): 59.

services rather than jail, they did not determine the effectiveness of the program in addressing police shootings of mentally ill suspects. Existing literature demonstrates the positive impact of CIT models on police interactions with mentally ill persons, but the findings of those studies are limited to desirable outcomes other than the reduction of fatal force against mentally ill persons.

Current literature has found substantial reductions in arrests by CIT-trained officers on mental disturbance calls, higher rates of referral to mental health services than their less-trained peers, and improvements in officers' preparedness, confidence, knowledge, and perception regarding interactions with mentally ill people. However, each of these studies did not consider, or were unable to make any conclusions about, the effectiveness of CIT models in reducing the use of force against mentally ill persons.

While the majority of literature addressed the other goals of CIT programs, one study did review the use of force. That study analyzed incident reports from the Las Vegas, Nevada Police Department to determine how frequently CIT-trained officers used force. The study found that CIT-trained officers only used force in 6 percent of the reported events, and that the level of force applied was strongly related to the perceived threat of the situation.<sup>22</sup> Unfortunately, that study did not include analysis of the use of force by non-CIT trained officers, so there is no context for comparison of the CIT-trained officers' use of force rate. The study also found that suspects were injured less frequently when CIT officers used force than when their untrained counterparts used

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<sup>22</sup> Skeem and Bibeau, "How does Violence Potential Relate to Crisis Intervention Team Responses to Emergencies?" 202.

force, and that CIT-trained officers were four times less likely to arrest suspects than traditional officers.<sup>23</sup> While the study did not draw any firm conclusions from the analysis because it lacked a control group, it concluded that the lower rates of suspect injury and arrest rates were evidence of the CIT model promoting safety and jail diversion.

As demonstrated by current scholarship, there is little evidence-based research to support the claim that CIT models reduce officer-involved shootings of individuals with mental illness. While some studies have shown significant impacts for smaller units of analysis, such as specific police districts, a statistically significant impact on a larger scale, nationally or even at the department level, has not been demonstrated effectively.

Current scholarship concludes that CIT models likely have reductive effects on police use of force, but that those effects are not substantial or observable for a variety of reasons. In most cases, participation in CIT training is voluntary and CIT-trained officers are not always the ones responding to mental disturbance cases. Additionally, a comprehensive dataset that includes shooting victim mental health conditions paired with police officer shooter training details does not exist. Without that level of information, most analysis is conducted at law enforcement agency department levels or higher. This high level of analysis likely conceals the extent of the CIT impact by not segregating data into distinct groups and classifications by officer training levels which would allow for control group comparisons in a quasi-experimental pre-test and post-test research design.

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<sup>23</sup> Ibid., 204.

Furthermore, as found in several studies, CIT-trained officers were slower to escalate use of force than their untrained peers, but CIT-trained and non-CIT-trained officers alike responded similarly to high levels of physical resistance. Consequently, while CIT-trained officers might use force less often or use less severe force in most cases, they appear to be just as likely as their peers to use fatal force when responding to behaviors they have been trained to recognize as lethal threats.

Despite these challenges, it is possible that new, or more substantive, findings might be reached with more and increased availability of information on police shootings, mental illness, and interactions between the two. Because of increased public attention devoted to police shootings, law enforcement agencies are making fatal police shooting information more readily available and that data is being compiled in more comprehensive datasets that allow for more extensive analysis. This paper seeks to close the existing knowledge gap and add to the current scholarship by conducting empirical analysis of the impact of CIT models on officer-involved shootings of mentally ill people.

### **3. Data and Methods**

In 2015, the Washington Post reported that there had been more than two times as many fatal police shootings in the United States that year as had been previously reported by local and federal law enforcement agencies.<sup>24</sup> The federal logs kept by the Federal Bureau of Investigation (FBI) and the Center for Disease Control and Prevention (CDC) were found to be woefully incomplete due to lack of diligence by the federal agencies

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<sup>24</sup> The Washington Post, *2018 Police Shooting Database*, updated February 5, 2018, <https://www.washingtonpost.com/graphics/2018/national/police-shootings-2018/> (accessed February 7, 2018).

and the local law enforcement agencies that are supposed to be forwarding that information to them. The FBI has vowed to overhaul how it tracks fatal police encounters, but that process is still underway and is dependent on local law enforcement agencies to provide that information.

### **3.1. Sources**

Following the Post’s reporting on the inadequate reporting available on police shootings, it began compiling OIS reports in a database and publishing datasets and summaries of the information annually. The Post made these reports publicly available in its “Fatal Force” police shooting database. The dataset used for this analysis includes every fatal shooting in the United States by a police officer in the line of duty that the Post has been able to uncover since January 1, 2015 through February 5, 2018.

The Post obtained the records in the dataset by researching local news reports, law enforcement websites and social media, local government open data programs, independent databases (e.g. Killed by Police, Fatal Encounters, etc.), and through open-record requests.<sup>25</sup> The Post database is one of the most comprehensive compilations of OIS reports, in volume of reported incidents.

To supplement the “Fatal Force” dataset, the University of Memphis Crisis Intervention Team (CIT) Center’s compilation of localities and regions with CIT was merged with the “Fatal Force” dataset to identify whether OIS locations had a local CIT

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<sup>25</sup> The Washington Post, *2018 Police Shooting Database*.

program.<sup>26</sup> Additionally, United States Census Bureau data was merged with these datasets using the Census Bureau's American FactFinder tool.<sup>27</sup> Census data incorporated into the dataset included local population, demographics, social, and economic characteristics. Finally, local crime data was added to the dataset using the FBI's Uniform Crime Reporting (UCR) statistics.<sup>28</sup>

Because the county level was the lowest level at which this data was compiled and made available for all of the datasets, the population and related characteristics included in this study are for the county in which each OIS incident occurred. The local characteristics collected by the Census Bureau are 5-year estimates for the period of 2012 to 2016, which only partially spans the period of time covered in the "Fatal Force" dataset; however, that was the most recent update available. Similarly, the most recent full update of the FBI's UCR statistics was also in 2016. For these reasons, 2016 statistics were used for all local characteristics.

### **3.2. Content**

The Post dataset includes 3,053 observations and is routinely updated as additional OIS are discovered. The dataset used in this analysis was last updated on February 5, 2018. The variables include the date and location (city, state) of the incident and the suspect's name, age, gender, and race. The data set also includes the manner of

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<sup>26</sup> University of Memphis Department of Criminology and Criminal Justice, *CIT Center Home*, <http://cit.memphis.edu/> (accessed January 28, 2018).

<sup>27</sup> United States Census Bureau, *American FactFinder*, <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml> (accessed February 8, 2018).

<sup>28</sup> Federal Bureau of Investigation, *Uniform Crime Reporting Statistics*, updated January 26, 2017, <https://www.ucrdatatool.gov/> (accessed February 8, 2018).



death (“shot” or “shot and Tasered”), whether the person was armed and the type of weapon if they were, if the suspect exhibited signs of mental illness, if they attempted to flee, the assessed threat level (“attacked police,” “undetermined,” etc.), and whether police had an activated body camera.

The Census Bureau’s American Community Survey (ACS) datasets include extensive local characteristics such as population, age, gender, citizen, place of birth, household, employment, education, income, and other subsets of those categories. Although the dataset includes county-level information for counties nationwide, the merged dataset only includes statistics for the counties where an OIS occurred during the period captured in the “Fatal Force” dataset.

The UCR dataset includes crime statistics collected by the FBI from law enforcement agencies across the nation and includes crimes against persons, property, and society. These crimes are also categorized as violent crime (murder and nonnegligent manslaughter, rape, robbery, and aggravated assault) and property crime (burglary, larceny-theft, and motor vehicle theft).

### **3.3. Descriptive Statistics**

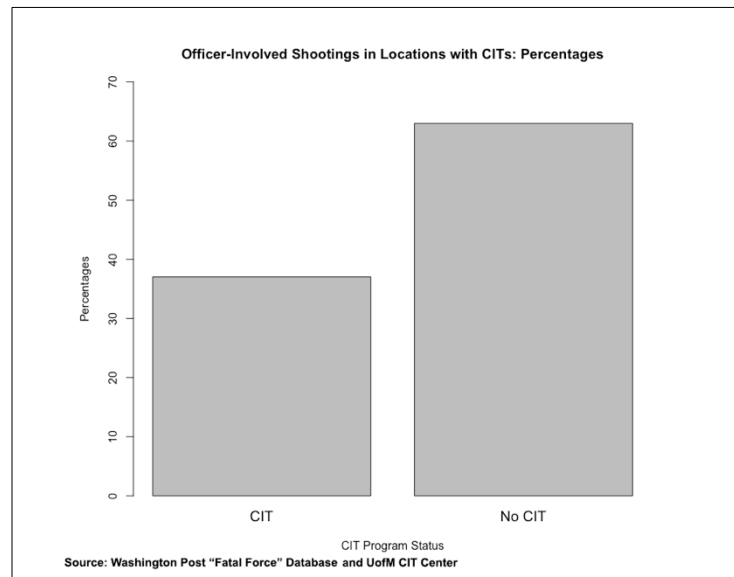
The merged datasets include 3,053 incidents of OIS since January 1, 2015. Out of all shootings recorded in the dataset, 751 of the individuals shot by law enforcement officers had exhibited signs of mental illness (24.6 percent). In 2,302 of the cases reported (75.4 percent), the individual did not exhibit signs of mental illness. Additionally, 1,130 of the shootings (37.0 percent) took place in locations with local CIT programs and the remaining 1,923 shootings (63.0 percent) occurred in locations without

CIT programs. Figure 1 shows the percentage of fatally shot suspects shot who were exhibiting signs of mental illness (TRUE) and those who were not (FALSE).



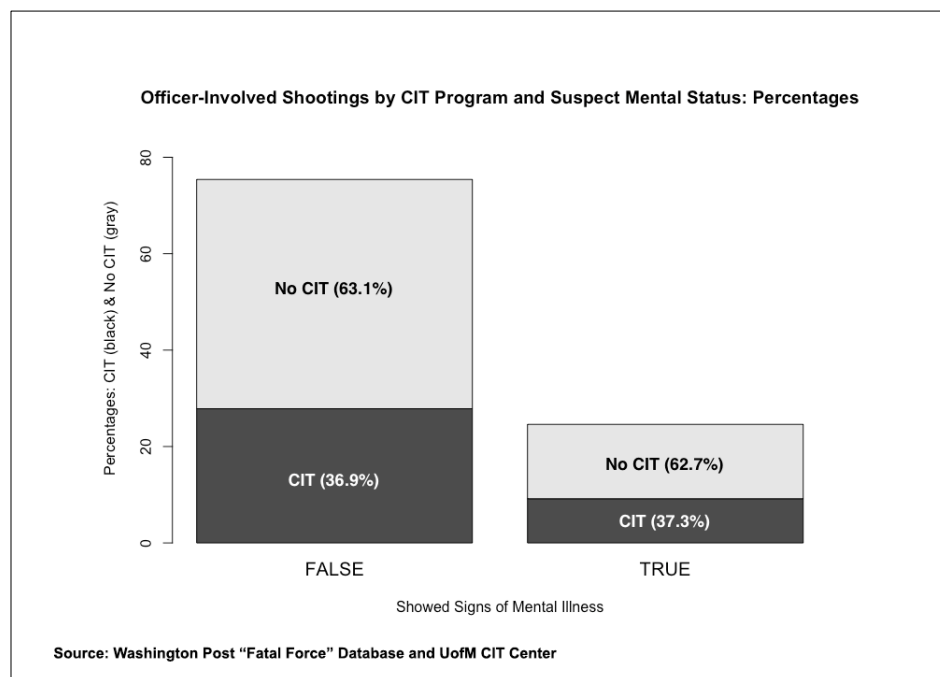
**Figure 1. Percentages of Suspects Exhibiting Signs of Mental illness in OIS.**

Figure 2 shows the percentage of all OIS that occurred in locations with CIT programs (CIT) and those that occurred in locations without CIT programs (No CIT).



**Figure 2. Percentages of OIS Occurring in Locations with CIT Programs.**

Of the 751 police shootings of individuals showing signs of mental illness, 280 of them occurred in locations with CIT programs and 471 occurred in locations without CIT programs. While cities without CIT programs collectively have more shootings of individuals showing signs of mental illness and shootings overall, locations with CIT programs have higher rates of law enforcement shootings of individuals showing signs of mental illness. Figure 3 shows the percentages of OIS by whether the location had a CIT program and whether the suspect showed signs of mental illness (TRUE) or not (FALSE).



**Figure 3. Percentages of OIS by CIT and Suspected Mental illness Status.**

Although 37.0 percent of all OIS occurred in locations with CIT programs, a slightly greater proportion, 37.3 percent, of all shootings of individuals showing signs of mental illness occurred in locations with CIT programs. The 751 shootings in locations with CIT programs took place in 339 unique cities, while the 1,923 shootings in locations

without CIT programs took place in 1,471 unique locations. The 280 shootings of individuals showing signs of mental illness in locations with CIT programs occurred in 166 unique locations and the 471 shootings of mentally ill individuals in locations with no CIT programs occurred in 428 unique locations. While there have been fewer shootings of mentally ill persons than shootings of persons without mental illnesses, the shootings of mentally ill people are less widely dispersed and they occur at higher rates in the locations where they do happen.

### **3.4. Methods**

Empirical analysis of the dataset was conducted using R statistical computing software. A multivariate logistic regression of the merged dataset was conducted to understand the probability of the occurrence of an OIS of a mentally ill person in localities with CIT programs compared to those that did not have CIT programs, controlling for other relevant variables that might have interactions with the variables of interest. The dependent variable in the multivariate logistic regression is officer-involved shootings (OIS) of individuals showing signs of mental illness, and the predicted values of the occurrence are bounded between 0 and 1. In other words, the predicted value of the model is the predicted probability of an OIS of a mentally ill person given the values of all independent variables.

The model represents the log odds probability of a binary result, a mentally ill person being shot by a police officer, occurring when controlling for the other variables included in the model. The intercept of the model represents the log odds probability of any mentally ill person being shot by a police officer without the added or reduced impact of the other variables. The coefficient of each variable in the model is the

percentage increase or decrease in the log-odds probability of the response variable, OIS of a mentally ill person, happening. The model includes the shooting victim's age and gender, and if they were armed or attempted to flee or attacked police officers. The model also includes the independent variable of interest which identifies the presence or lack thereof of a CIT program in the location of the shooting.

The dependent variable, police shootings of persons showing signs of mental illnesses, were then regressed on the independent variable of interest, the presence of a CIT program in the location of the shooting, and the other variables of interest. Multiple models were included in the analysis to ensure sufficient and appropriate variables were included in the model. Summary statistics with confidence intervals were calculated for each variation of the model, and then a Wald (Chi-squared) test was conducted to determine which model best fit the observations in the dataset. In the null hypothesis, there is no difference in the log-odds probability of an OIS of a mentally ill person occurring due to the presence of a CIT model, while the alternative hypothesis is that there is a statistically significant difference in the log-odds probability of that response happening when a CIT program is present in a location. The Chi-squared is calculated using the formula below, where  $f_e$  is the expected log-odds probability of an OIS of a mentally ill person occurring if the null hypothesis is true and  $f_o$  is the actual occurrence of OIS.

$$\chi^2 = \sum ((f_o - f_e)^2 / f_e)$$

The degrees of freedom of the Chi-squared analysis are the number of columns of data, less one, multiplied by the number of rows, also less one. Using a Chi-squared table of

critical values, the degrees of freedom can then be used to determine if there is a statistical significance and if the model is a good fit.

#### 4. Results

The main finding of the multivariate logistic regression is that having a local law enforcement CIT program is associated with a higher rate of OIS of individuals showing signs of mental illness, but that presence of a CIT program is not statistically significant or an effective predictor of whether people with mental illnesses will be shot by police. After attempting multiple iterations of the regression model with local characteristics and finding none to be statistical significant, the best fit model, as predicted by existing literature, primarily included variables related to suspects' level of aggressiveness or physical resistance (attacking the officer or attempting to flee). The equation for the resulting model is:

$$\begin{aligned} \text{mental.OIS} = & 0.42312 + 0.01130(\text{has.CIT}) + 0.05585(\text{was.armed}) \\ & - 0.03043(\text{age\_young}) - 0.12506(\text{male}) - 0.04316(\text{attaked}) \\ & - 0.19872(\text{fled}) \end{aligned}$$

In the model above, the dependent variable (*mental.OIS*) represents the log-odds probability (on a scale of 0 to 1) of a mentally ill person being shot by a police officer. The coefficient of the intercept is interpreted to mean that there is a 0.42312 log-odds probability of a mentally ill person being shot in a location in the dataset, controlling for the other conditions in the model. Each variable in the model is binary, meaning that a value of 0 would for *has.CIT* means the location does not have a CIT program and a

value of 1 means that it does. Similarly, a value of 1 for *male* indicates that the suspect was a male and a value of 0 would indicate they were female, and so on for each variable.

By interpreting the coefficients of the variables in the model, it is determined that having a CIT program (*has.CIT*) is associated with a 1.130 percent increase in the log-odds probability of having an OIS of a mentally ill individual compared to locations without CIT programs and when controlling for other factors in the model. While the effect of having a CIT program was expected to be marginal based on existing scholarship, the resulting increase in the probability of an OIS occurring is contrary to the theorized outcome. Table 1 below shows the coefficients, standard errors, and other descriptive statistics for the model.

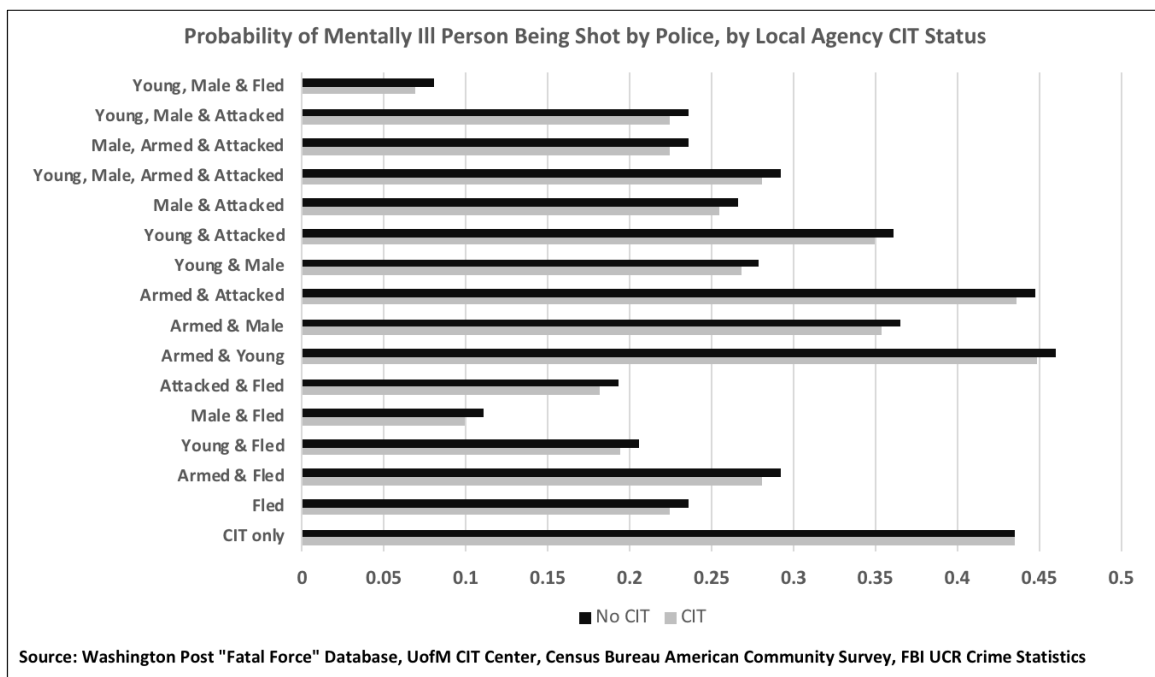
<b>Coefficients</b>	<b>Estimate</b>	<b>Standard Error</b>	<b>t-value</b>	<b>Pr(&gt; t )</b>	<b>Significance</b>
<i>Intercept</i>	0.42312	0.04807	8.802	<2e <sup>-16</sup>	99.9%
<i>has.CIT</i>	0.01130	0.01599	0.707	0.479835	
<i>was.armed</i>	0.05585	0.03010	1.856	0.063618	90.0%
<i>age_young</i>	-0.03043	0.01693	-1.798	0.072344	90.0%
<i>male</i>	-0.12506	0.03786	-3.303	0.000967	99.9%
<i>attacked</i>	-0.04316	0.01619	-2.666	0.007728	99.0%
<i>fled</i>	-0.19872	0.01680	-11.827	<2e <sup>-16</sup>	99.9%

**Table 1. Results of Multivariate Logistic Regression Analysis.**

The coefficient for *was.armed* indicates that there is a 5.585 percent increase in the log-odds probability of the mentally ill person being shot if they were also armed. The magnitude and additive impact to the probability of the suspect being shot are as expected. It is logical that the suspect being armed would contribute to escalation of the situation and either perceived or real threat. While the impact of being armed seems logical, the effect of being young (*age\_young*), male (*male*), and attacking (*attacked*) or

fleeing (*fled*) had counter-intuitive effects on the probability of the person being shot. Each coefficient for these variables were negative, indicating they decrease the probability of the person being shot, while logic would indicate that any of those actions escalate the probability for use of force.

Figure 4 below shows the results of this model for some of the more common scenarios observed in the “Fatal Force” dataset. The longer bars in the chart illustrate a higher probability of an officer-involved shooting of a mentally ill person occurring given the stated conditions. It seems unlikely that a police interaction with an unarmed mentally ill person who did not flee or attack the police officer would have a higher probability of being shot than an armed male who did attack or flee.



**Figure 4. Modeled Probabilities of Mentally Ill Persons Being Shot by Police, by Local Agency CIT Status.**



As indicated by the significance codes in Table 1, the coefficients of the variables indicating whether the suspect was a male (*male*) and if they attacked or fled from the police officers (*attacked* and *fled*) from police officers were all statistically significant at the 99 percent confidence level or higher. The coefficients of the variables indicating whether the suspect was armed (*was.armed*) or if they were in the 20 to 44 years old age group (*age\_young*) were statistically significant at the 90% confidence level, lower than the typically accepted confidence level of 95 percent.

Because the standard error of the CIT variable (0.01599) is relatively high in comparison to its coefficient (0.01130), and because the confidence interval of that variable includes zero (-0.02003687 to 0.042631801), it is determined that the additive effect of having a CIT program on the probability of an OIS occurring is not statistically significant. Additionally, the t-value of that coefficient (0.707) is large in comparison to the standard error and is not that far away from zero. Furthermore, the p-value of that variable (0.479835) is well above the five percent threshold. For these reasons, it is apparent that the effect of having a CIT program on the log-odds probability of the occurrence of OIS shootings of individuals showing signs of mental illness is not statistically significant.

There are several reasons the effects of CIT programs might not be statistically significant. First, the data set includes only instances in which an OIS occurred. This condition has several significant impacts on the analysis. Because only incidents that result in shootings were included in the dataset, the potential effects of CIT in deescalating situations and preventing shootings cannot be fully analyzed. The dataset only allows a comparison of OIS of mentally ill individuals to the occurrence of all OIS,

or the occurrence of OIS in cities with or without CIT programs. The available data does not allow an analysis of the incidence of OIS in the context of all law enforcement interactions with mentally ill people. Furthermore, it does not take into account whether locations with CITs and high rates of OIS had higher rates of OIS prior to implementation of CIT programs or if they have higher concentrations of mentally ill persons in the locale.

Additionally, it is counterintuitive that being between the ages of 20 and 44, being male, and attacking or attempting to flee from an officer would have negative effects on the probability of a mentally ill person being shot. Most of those characteristics are presumed to have increasing effects on the probability of being shot by a police officer. Because of the limitations of the data, comparing only to other cases of OIS rather than all mental disturbance calls, the statistical interpretation of the coefficients of these conditions are likely incomplete and skewed.

Although the effects of the conditions of interest were insignificant and in a direction not expected, the results of the regression analysis and subsequent findings do align with existing scholarship. The expected impact of CIT programs was not statistically significant and the more substantive impact on the response variable were conditions related to suspects' aggression and resistance rather than the training of the officer or local population, demographic, economic, or educational characteristics.

## **5. Conclusion**

There are several conclusions to be drawn from this study. Foremost, the impact of CIT models on police officer shootings of mentally ill persons is negligible and not statistically significant. This is likely due to the lack of depth and scope of information

available to the public on police shootings and the implementation of CIT programs. Existing datasets do not include officer-level CIT-training information. Interactions of CIT-trained and non-CIT trained officers with mentally ill people are not tracked at a granular enough level and are not paired with officer training information. Current comprehensive datasets of national-level data are limited to fatal interactions and provide no information on de-escalated situations. Therefore, comparisons can only be drawn to other fatal interactions and not to non-fatal ones. Without this information, the true effect of these factors and their interactions cannot be accurately measured.

Secondly, while the presence of a local CIT program and other local characteristics have relatively little impact on the probability of police shooting a mentally ill person, the level of aggression, resistance, and armed status of the suspect do have statistically significant effects on the outcome. The conclusion that can be drawn from this is that police officers, CIT-trained or not, respond to situations of escalated threat risk relatively similarly and CIT training does not have a substantive effect on perceiving a threat to be lethal. While the perception of threat is observed to have a greater effect than CIT de-escalation training, this analysis cannot draw conclusions on whether that is because of the strength of police threat recognition training or weaknesses in CIT de-escalation training, or the result of natural human conditions.

Finally, more substantive findings through future research is unlikely for a national-level analysis unless additional steps are taken to expand the contents, completeness, and availability of existing information base available. While case studies, particularly those at the district level, may conclude that there are more substantive impacts of CIT programs, it is unlikely that statistically significant results will be

observed at a higher level unless shooter and suspect information is tracked at a more granular level, CIT training is made mandatory for entire organizations, or true experimental research design is implemented with control groups. For any of these scenarios, a thorough analysis will also require a more extensive dataset of incidents than is currently available in the Post's "Fatal Force" dataset.

### **5.1. Limitation of Research**

The research was limited due to the lack of available information. The "Fatal Force" dataset includes only two years of OIS information, which does not allow for substantive time-series analysis. Also, as previously mentioned, data is not available on non-lethal police interactions with mentally ill persons. Therefore, comparisons at the national level are limited to other fatal encounters with those not showing signs of mental illness and in other locations that have experienced OIS in the last two years. Additionally, not enough information is available on when local agencies began their CIT programs, the current status of those programs, how many current officers are trained in the program, or how effectively they utilize those trained officers. Adding this information would contribute to more substantive and applicable findings.

### **5.2. Recommendations for Future Research**

Future research should collect or compile more extensive OIS and CIT data. Collecting OIS and active CIT program information over a lengthier period of time would allow for time-series and regression discontinuity analysis to determine the change in occurrence of OIS of mentally ill persons before, during, and after the implementation of a CIT program. Because that level of information was not available in the datasets used for this analysis, and because only a relatively short period of time has passed since

the Post began tracking fatal shootings by police officers, that level of analysis was not possible for this research. To make more extensive analysis possible, local law enforcement agencies need to more consistently and thoroughly provide reports of OIS information to appropriate federal law enforcement agencies. Federal agencies need to improve their methods of processing and reporting on that information in a way that is transparent and useful to general consumption.

### **5.3. Implications of Findings**

While no substantive conclusions or implications can be drawn about the effectiveness of CIT program in addressing police shootings, the existing research on the topic presents compelling evidence that CIT programs have a number of other positive effects on police officers and the mentally ill persons they interact with. No specific recommendations or revisions to existing CIT programs were identified through the course of this analysis other than that law enforcement agencies may be better able to determine the effectiveness of CIT programs by implementing agency-wide CIT training or conducting pilot programs with control groups. It should also be noted that in many cases for smaller locations with lower crime rates and infrequent police shootings, it may take many years before an effect or trend is observable. With those recommendations in mind, it is imperative that organizations like the Washington Post continue to collect this information to hold law enforcement agencies accountable, and that those law enforcement agencies also collect and disseminate the relevant information to federal law enforcement so additional research, analysis, and broader policy analysis can be conducted in the future.

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## **Curriculum Vita**

Brian J. Connell was born on February 15, 1985 in Oklahoma City, Oklahoma. He received an Associate of Science Degree in Business from Oklahoma City Community College in 2005. In 2010, he graduated from the United States Military Academy at West Point with a Bachelor of Science Degree in Economics and commissioned as a U.S. Army Field Artillery Officer. While in the U.S. Army, he served as a platoon leader, company fire support officer, and battalion current operations officer. After separating from military service, he has served in financial management and analysis positions in state and local government. He is currently a degree candidate at Johns Hopkins University and is pursuing a Master of Science Degree in Government Analytics with a concentration in Public Management. In his professional and academic pursuits, he seeks to use quantitative information and applied analytical methods to improve the efficacy and efficiency of government and government services.